

to draw any certain conclusion regarding the relation of non-pathogenous to pathogenous bacteria. Clinical experience would indicate that the activity of the infective virus may vary within certain limits. And we must apparently admit that the infective bacteria have not always possessed their noxious qualities, but have acquired them somehow in the course of ages. But this is not enough to convince us that harmless bacteria can acquire infective properties rapidly. . . . We may therefore provisionally conclude that the transformation of innocuous into noxious bacteria can occur but rarely, and under special conditions."

Recent work both in this country and on the Continent seems to go against the mutability theory, and in all probability it will soon be made clear that Buchner's experiments are capable of another interpretation from that hitherto adopted.

Enough has been said to indicate that the English edition of Ziegler's Pathology will not only prove of immense help to the student, but that it will also be invaluable to the practitioner. It is to be hoped that the second part, on Special Pathological Anatomy, will soon appear, and that it will equally commend itself to English readers.

The numerous woodcuts with which the work is illustrated are beautifully distinct, the type and paper are everything that could be desired, and so successful has the editor been that there is no evidence of the greater part of the work being a translation.

ENSILAGE

Ensilage in America. By James E. Thorold Rogers, M.P. (London: W. Swan Sonnenschein and Co., 1883.)

PROFESSOR ROGERS has contributed a most interesting little book on *Ensilage in America*. He has no doubt been serviceable to his country in drawing public attention to a subject of importance; but like most persons who focus their eyes upon a single point, he has lost the due proportion in which it stands to its background, foreground, and surroundings. Perhaps this may be forgiven as a common fault, or it may be the secret of strength, in all propagandists. Be this as it may, it is a marked feature in the volume before us. *Ensilage* is to be the temporal salvation of the farmer. The Professor appears to have been carried away on the full tide of American enthusiasm, buoyed up by a certain youthful airiness scarcely consistent with the gravity of an Oxford Don. He has forgotten the salt, and those who read his book (and we trust they may be numbered by thousands) must add it for themselves.

Ensilage is the preservation of green fodder in its natural succulent condition in pits or *Silos*. These pits must be airtight and watertight, and the fodder must be so well trampled into them and weighted on the top as to arrest fermentation. The theory of the process is that, in the case of fodder so treated, heat is generated and fermentation commences. The small amount of oxygen held in the interstitial air is speedily absorbed, and its place taken by carbonic acid gas. Just as a lighted candle extinguishes itself in a bath of choke-damp of its own making when burnt in a closed vessel: so the fermenta-

tion and its accompanying heat are arrested in the mass of closely packed fodder which is in fact immersed in a bath of carbonic acid, and thus securely protected from ordinary atmospheric action. Well preserved *ensilage* comes out of the pit almost as green and fresh as when it was first put into it, and has acquired a pleasant vinous smell and slightly acid flavour, which has given it its name of *sourhay* in Germany, Austria, and Hungary. The process is at once simple and effective, but is no doubt expensive when carried out upon the scale which a successful experiment demands. Thus the larger the pit the more assured the success, as all the conditions are more perfectly attained. At p. 22 we read: "M. Havemeyer's silos were four—two fifty-nine feet long and fourteen feet wide; and two thirty-five feet long and twelve feet wide, each pair being twenty-five feet deep. They are under the same roof as the feeding barn, where there is standing-room for ninety-eight cows." The pits are bricked and cemented, or built with concrete walls, and they may be carried up higher than the level of the ground, or may be built entirely from the surface. When the ground is naturally dry and of a clayey or close texture the silo need not be lined. It is recommended that a drain should if possible be carried from the bottom of the silo to take off superfluous water. Simple as these directions undoubtedly are, they point to a heavy initial expenditure, only to be recommended after very mature consideration. On the other hand silos of smaller size, as, for example, 22' X 9' X 15' deep and other dimensions, are also mentioned. Still the fact remains that in small silos there is more waste and greater uncertainty. Also that for practical purposes a small silo would be of little value. The process of storing the fodder is very easy to understand. It is, in the case of green maize, cut up with a powerful chaff-cutter, trampled into the pit by men or horses, and when the space is filled it is covered with boards and weighted down with boxes of stone or earth to a pressure of about 100 lbs. per square foot. The fodder settles down under pressure, and is found after several months to be perfectly palatable and fresh.

Such is the process which Prof. Rogers now lays before the British public with the strongest possible recommendations. Not only so, but with threatenings or at least warnings also, for we are told that "if the New Englanders and New Yorkers succeed in extending their *ensilage* system, they will strive to find a foreign market for their increased produce." This process, it is urged, is entirely to revolutionise agriculture. It is to be a new point of departure, a "new dispensation." "Is there not a bonanza (a mining term for peculiarly rich ore) in the farms with this new enterprise? Will it not give the farmer such profits, with less labour, as will enable him to be more independent? Is it not going to create new interests with our sons, when they can find a more profitable employment, with less hard labour than can be found in any business in our cities?" It is to double the population of "our New England cities," and indeed appears to be a veritable *El Dorado* for farmers.

In thus introducing *ensilage* to the attention of his countrymen, Prof. Rogers is scarcely cautious in the manner in which he discounts the value of scientific and especially of chemical opinion upon this subject. "*Ensilage* is to be the food of the future for pigs and poultry

as well as for horses and bullocks." But it is only grass after all, and we can hardly believe that it can be superior to the herbage from which it was made. Pigs and poultry will graze in pastures it is true, but the digestive systems of these animals demand more concentrated foods. There is an evident tendency to "forget the rock from which it was hewn," if we may apply such words to the process of ensilage. It is green fodder *preserved* until winter. Well! if preserved until winter it cannot be eaten in summer. If eaten in summer it surely would also have been realised.

It may be better than hay, but we cannot expect from ensilage such superlative results above what might reasonably be expected from hay. Such high-flown anticipations as are embodied in Prof. Rogers's book are usually doomed to disappointment, and the process of ensilage will probably take its place in American and English agriculture as it has already taken its place in the agriculture of the Continent of Europe, among other improvements of the nineteenth century, but without overtopping any of them.

Prof. Rogers does not appear to have informed himself as to the state of our knowledge in England upon this topic. The process was fully described by the present writer for the Royal Agricultural Society in 1874. He also drew attention to it in two letters to the *Times* in 1875, when it evoked considerable discussion, under the title of "Potted Hay." The process was also both described and illustrated by drawings in the *Agricultural Gazette* at the same period. Since then it has been repeatedly tried, but in all cases without marked success. We are ready to allow that this want of success has been due to the experiments having been conducted upon a small scale and probably with too much regard to economy of outlay. The process is too generally successful in many countries to be capable of being challenged. So late, however, as 1875 Prof. Tormay of Pesth wrote to us that practical men were greatly divided as to its value. No doubt the making of sourhay deserves further trial, and there is as little doubt that it will be largely experimented upon during the coming summer. It must, however, be remembered that it may be as profitable to eat the herbage when growing, as to preserve it *in any form* for the winter. Also that our turnips, swedes, and mangels give us a means of producing meat in these countries which is not possessed by American agriculturists. Turnips and hay are probably a better combination of succulent and dry food for winter feeding than turnips and ensilage would be. In this matter we prefer to suspend judgment for a while upon the uses of ensilage to the British farmer. At the same time we cordially agree that it is likely to be particularly useful in the Eastern States of America, where the soil and climate are unfavourable to the growth of roots and favourable to the growth of maize. On this point we have abundant testimony in Prof. Rogers's book. A special attraction towards ensilage is that it can be carried out without delay in any weather, and that it saves the anxiety of haymaking.

Those who have tried it in this country complain that it is very difficult to keep the pit good when it has been once opened. Still the process is worthy of more extended trial, and if carried out without so much fear of the

initial expense and risk of failure, may be shown to be of service to English agriculturists.

JOHN WRIGHTSON

OUR BOOK SHELF

Another Book of Scraps, principally relating to Natural History With thirty-six Lithographic Illustrations from Pen and Ink Sketches of Wild Birds. By Charles Murray Adamson. (Newcastle-on-Tyne: Reid, 1882.)

MR. ADAMSON has been so much amused by the preparation of his first "Book of Scraps" that he has prepared another, and invites our opinion upon it. We cannot say that we have derived much information from looking through his letterpress, although we perfectly agree with him that the study of natural history, which he advocates, "opens out a wide field for the profitable employment of the mind." But the thirty-six illustrations which form the main portion of the book certainly show that the author has studied the forms and habits of wild birds to some purpose, although in an artistic point of view, perhaps, it would not be difficult to criticise the surroundings amongst which he places them. The drawings are a little rough, as Mr. Adamson himself confesses, but no naturalist can turn them over without recognising at once the species which are intended to be portrayed. We have seen pictures in the Royal Academy of which the same remark could not truthfully be made. Mr. Adamson is evidently most at home on the sea-shore. His sea-birds are best. With his woodcocks and partridges we are not so well satisfied. But "Another Book of Scraps" will make a nice addition to a drawing-room table.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Incubation of the Ostrich

I HAVE received the following letter from Mr. J. E. Harting, and with his permission send it to you for publication. I do so partly in justice to Mr. Harting himself—the letter having been originally written to the *Spectator* in vindication of his own accuracy, and having been rejected by the editor—and partly because I think it desirable that the point in natural history which it discusses should be definitely cleared from the erroneous views which, as I shall presently show, are still prevalent with regard to it.

ANIMAL INTELLIGENCE

To the Editor of the *Spectator*

SIR,—I have just read in your issue of February 3 a letter from Mr. G. J. Romanes to which a long editorial note is appended, and which raises an interesting question relating to the incubation of the ostrich. As my name is mentioned as having written something on the subject, perhaps you will allow me to offer a few remarks.

Briefly stated, the point under discussion is this: Mr. Romanes, in his recently-published work on "Animal Intelligence," has observed that in the case of the ostrich *the task of incubation is shared by both the sexes*.

In reviewing this work your critic alleges that "female ostriches take no part in the duty of incubation"—that is, they do not assist the male.

Whereupon Mr. Romanes cites his authorities for the statement made by him, and refers amongst other sources to my book on ostriches, published in 1876, wherein (at p. 41) I remark that "the males are polygamous, each associating with three or four hens, all of which lay their eggs in one large nest scooped